Canadian
Environmental
Advisory
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Report No. 11
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WILDLIFE CONSERVATION ISSUES IN NORTHERN CANADA

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CANADIAN ENVIRONMENTAL ADVISORY COUNCIL

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- such matters as may specifically be referred to it by the Minister;
- the state of the environment and threats to it;
- the priorities for action by the federal government or by the federal government jointly with the provinces;
- the effectiveness of activities of the Department of the Environment in restoring, preserving or enhancing the quality of the environment.

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To carry out its functions the Council undertakes studies and reviews of matters of environmental concern and policy, holds regular meetings to consider progress and developments with regard to these concerns, and prepares comments, statements and reports as appropriate. The Council publishes an *Annual Review* which includes a summary of the state of the environment in Canada, and from time to time reports on other matters of general interest and importance.

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PREFACE

Over the years of its existence, the Canadian Environmental Advisory Council has had a continuing interest in the status and well-being of wildlife in Canada. In 1979, Council became convinced that the wildlife in northern Canada were in a crisis condition. Most species were shrinking in numbers, some very alarmingly, and policies and management practices simply were not emerging at either the federal or territorial levels. Moreover, it was apparent that support for research on wildlife in the North, an essential prerequisite for sound management plans, was seric sly eroding and given a very low priority. As a consequence of this conviction, Council commissioned its out-going Chairman, Dr. Ian McTaggart-Cowan, to study the situation and prepare this report on Wildlife Conservation Issues in Northern Canada.

There are few issues that better illustrate the complexities of environmental problems than that of wildlife. Its components range from severe tensions between southern nature enthusiasts and northern exploiters, political timidity in applying already existing regulations, struggles for power between the federal and territorial governments, international interests in migratory species, politicization in the process of negotiating native land claims, and the impacts of extensive search for and development of non-renewable resources in the North, to the pressures of modern social and technical systems on native subsistence cultures. This is just a sampling of the pressures, paradoxes and conundrums that must be resolved if northern wildlife is not to be the helpless victim at the end of every failed process of conflict resolution, negotiation and compromise. Our record in these processes is not good. Meanwhile, the wildlife continues to vanish.

Dr. McTaggart-Cowan has done an outstanding job in meeting the challenge of preparing this report and it has received the unanimous approval of Council.

Donald A. Chant
Chairman

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Ce rapport est aussi disponible en français

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ABSTRACT

The Yukon and Northwest Territories together comprise some four million square kilometres and primitively supported a population of perhaps ten thousand aboriginals living as hunter-gatherers. This population has tripled and continues to increase at about 3.9 percent per annum.

This much larger population retains a preference for mild meat and fish as major parts of its diet. Whereas in primitive times, the technology and hunting techniques probably did not permit the subsistence user to make a serious impact on the wildlife food resource, other than some species in some places, the people are now equipped to impose serious overkill. Up to the end of the 17th century, the numbers of people were roughly regulated by the availability of food animals, but the situation is now reversed. Caribou, moose and grizzly are especially vulnerable.

While this increasing population, with improved mobility (skidoo and aircraft hunts) and modern weapons, ammunition and rifle sights, is putting wildlife under heavy pressure, industrial development is introducing new levels of disturbance.

Urbanization, the availability of the work and welfare society, the movement to establish land claims and to assert the right to kill wildlife at pleasure are factors complicating the search for an adequate conservation strategy.

It has been suggested that the territorial wildlife offers potential for limited commercial exploitation. The writer can see no evidence that this is possible; indeed, sharply reduced kills of caribou and beluga are imperative.

In the Northwest Territories, there is a move to transfer all responsibility for wildlife management to the local Hunters and Trappers Associations. While it is important that the user groups participate in the designing of regulations, it is essential that management be based upon facts obtained through scientific research. The territorial administrators must retain the authority to make decisions derived from a consideration of established data and use this knowledge to bring about effective management.

Some caribou herds migrate from wintering areas in the provinces to summer ranges in the tundra and pass through at least two administrative districts and two or more subsistence hunting grounds. Under such circumstances, local hunter-trapper groups cannot determine tolerable levels of kill or manage such stocks in their own long term best interests.

Alaska, Yukon, NWT and Québec are each moving along different paths in the search for conservation/management approaches which will meet the new needs.

The basic goals of wildlife conservation are the same in the North as elsewhere, but managers of northern wildlife are facing completely new situations requiring novel strategies. Gaining the understanding and cooperation of the Inuit and Indians is one prerequisite to a successful strategy, but it must be matched with research, monitoring and the application of well designed management principles and practices.

The support of all levels of government and the cooperation of the Yukon and Northwest Territories wildlife administrations, the Canadian Wildlife Service, the Department of Fisheries & Oceans, the provincial bodies as required and the subsistence users are essential if the conservation of northern wildlife, and the preservation of a way of life, are to be achieved.

Introduction

Canada north of 60° north latitude and west of Hudson Bay comprises two political entities, the Northwest Territories and the Yukon Territory. In the far west, the Yukon has a common boundary with Alaska along the 141st meridian of longitude. The Northwest Territories including the Arctic Archipelago has a land area of 3.38 million km^2 (1.3 million square miles), about one third of the total area of Canada. The Yukon has a land area of 510,000 km^2 (187,000 square miles).

There is no precise information as to the number of aboriginal people that were able to extract a livelihood from this region, one of the world's more inhospitable environments, in the period before 1600 A.D. Thompson (1966) suggested a population of Chipweyan Indians then of between 4,670 and 10,652. Mooney (cited by Kroeber 1939), using a different basis for estimation, placed the combined total number of Chipweyan and Caribou-Eaters prior to 1600 at about 3,500. To this would be added the small population of the Mackenzie Valley and Yukon (Slavey, Loucheux and Dogrib Indians). The earlier Canadian census figures do not distinguish between Inuit and Indians, but the 1931 census places the combined number as Yukon 1,628, Northwest Territories 8,786; total 10,414. The native population is therefore estimated to have been at a density of about 0.27 per hundred km^2 in 1931. The present day population of Inuit and Indians in the Northwest Territories is about three times this figure (Hamelin 1979).

There were no fixed settlements of Indians when Europeans first entered the area. Effective use of the resources required a widely dispersed mobile population. The 'tent' was the basic unit of occupance, and groupings of more than a few people were ephemeral. The 'tent' was typically composed of a couple or a man with more than one wife, their children, siblings, and their offspring or hunting partners and their families - about eight to ten individuals (Bone 1973).

The Inuit are estimated to have numbered about 6,000 at the time of first European contact. Most dwelt in small 'villages', often seasonal, at the widely dispersed points along the Arctic coast where there was access to several different, seasonally replaceable food sources.

The establishment and survival of aboriginal populations in northern Canada was absolutely dependent upon the availability of the fishes, birds and mammals as food, clothing, fuel and many of the artifacts essential to human life in a neolithic culture. Many generations of people survived in North America north of 60° by virtue of their skill as hunters and fishermen. Inevitably a rich store of knowledge was gained, knowledge not only of the living creatures and their ways but also of the environment in which both man and animals survived.

The area remains today one the the largest areas in the world where the pursuit of wildlife is a major occupation and where the descendants of the original inhabitants still count upon 'country food' (i.e., wild-taken fish, mammals and birds) for a large part of their diet.

It is probable that the number of Inuit and Indians was related in a cause and effect way with their success in securing food. Usher (1979) suggests that food availability was not a problem but he cites no sources. The literature on northern exploration contains abundant reference to food scarcity, starvation and social responses among the people to the allocation of scarce resources. However, we do not know whether such instances occurred with sufficient frequency to serve as a curb on population growth. The only issue in the context of this paper is whether or not the 17th century population was a reasonable approximation of the carrying capacity of the land at that time. If so, was the relatively low capacity related to the overall food resources, or were there resources that were unused by virtue of distance, pattern of distribution, lack of information or limits of technology? There is reason to believe the latter to be true.

There can be no doubt that the abundance of wildlife species in pre-contact time fluctuated widely in response to environmental changes. It is highly probable that human killing from time to time also influenced the numbers or availability of some species in some locations.

The range of food organisms available to the Indians was dominated by the caribou, but moose were probably present thinly throughout the forested regions and muskox, bison and Dall sheep were accessible to some parts of the population. Beaver were widespread and important; hares, muskrat and smaller rodents, black bear, grizzly bear and lynx were used as also were the swans, geese, ducks, grouse, ptarmigan, cranes and other birds, as they became seasonally available. Fish were used extensively.

The Inuit food resources were gained primarily from the sea. As well as fish, the marine mammals - seals, walrus, beluga, narwhal, bowhead whale and polar bear - and locally nesting concentrations of marine birds and the colonially nesting geese - were used. Although caribou were important to some local populations, the intensive hunting of this animal by Inuit apparently is a recent development.

The Indians and Inuit had developed an elaborate technology for capturing food-animals. The available technology required close contact with the prey and, especially for marine mammals, the numbers killed but lost was probably low.

The invention and application of many hunting techniques reflected a detailed knowledge of some aspects of animal behaviour. On the other hand, the meagre literature of this aspect of human ecology in northern Canada lacks any reference to an understanding of the facts of input and output in populations, any concept of the numbers taken by humans, and variations in numbers of animals from year to year or the relationship of these to the numbers available for human use. Nor is there reference to the perception, by either Inuit or Indians, of wolves and polar bears as predatory competitors with man and thus to be destroyed in the interest of having more game for human use. This perception is now prevalent.

There is no evidence that the subsistence use of wildlife in northern Canada before 1600 A.D. resulted in the extermination of any species. Local populations of some species were probably destroyed and had to await natural recolonization. In much earlier times, native hunters may have been responsible for or contributed to the annihilation of vulnerable species in the late Pleistocene fauna of northern North America (Martin 1967), though climatic change may also have been involved. Macpherson & Brooks (1981) allude further to this matter, but by the 17th century the surviving species were those which, over the long run, could tolerate the kill which man could extract with neolithic hunting technology.

EUROPEAN CONTACT

The coming of the European whalers to the eastern Arctic, the American whalers to the western Arctic and the fur traders to the Middle North began a revolution in the relationship between man and wildlife in the Canadian North. Some of the main features of this revolution which had an impact on wildlife as a resource were:

1. *The introduction of a trading economy*

   The aboriginal people were led into a view of wildlife as a source of trade goods. By bartering wildlife products for the equipment tendered by Europeans, they rapidly improved their comfort (cooking pots, fly screening, canvas for tents, etc.); their ability in food procurement (firearms, steel traps, knives, axes, wire snares, fishnets, and manufactured fishing lines and hooks), and probably their leisure. However, the fur trapping culture required longer distance travel and so more dogs, which in large part eat what humans eat. More wildlife had to be killed to feed the dogs.

2. *Changes in movement and in residence patterns*

In time, the development of a dependence on the trader or whaler and his wares led to the abandonment of some of the traditional movements of family groups which were necessary for successful dependence upon wild resources. The change took place later among the Inuit than the Indians. Some people moved to settlements although in the 19th century these were largely peopled by Hudson Bay Company workers and 'fort hunters', hunting exclusively to provide food for the fort, and drawing abnormally on the food resources easily attainable in the vicinity.

For the Inuit, an intensive trade in furs did not arise until the early years of the 20th centry and did not at first involve a radical change in their way of life. The taking of furs (mainly Arctic fox) was often 'grafted' onto the pursuit of food. Urbanization of the Inuit was intensified in the 1960's with the advent of the housing program conceived by the federal government to help the people and facilitate the provision of social and administrative services. Along with possible social advantages, this concentration of the formerly dispersed population led to depletion of local food resources, increased dependence on imported food and clothing provided by a wage and aid economy, and a change to part-time hunting.

The wildlife in areas remote from the communities likely escaped intensive hunting at this stage, but the advent of the aircraft and the snowmobile brought these areas within reach. Changes in technology increased concentration on caribou as the primary source of country meat.

3. *Reduction in numbers of some species*

a) The *bowhead whale* was reduced to the edge of extermination by European whalers, who then turned to *beluga*, *narwal* and *walrus* which in turn were greatly reduced in numbers.

b) Early in the fur trade, the *muskox* was killed for its pelt and to provide meat for the whalers until it too became a vanishing species. Where there were people there were no muskox, where there were no people, muskox persisted.

c) Heavy demand for *beaver* pelts in Europe led to systematic and intensive hunting of the species by and on behalf of the traders until it became rare everywhere on the continent.

4. *Mortality of aboriginal people temporarily reduced demand for wildlife*

Hamelin (1979) states that prior to the European invasion, "excessive mortality rates due to epidemics, major hunting migrations ... are practically unknown". Along with the technological improvements brought to North America came communicable diseases hitherto not experienced by the aborigines, as well as distilled alcohol. The introduced diseases led to devastating epidemics. Around 1781, ninety percent of the Chipweyan people died of smallpox. Survivors numbered about 200 (Thompson 1966). Some groups, such as the original Inuit of the Mackenzie Delta, were almost extirpated.

Although there is no documentation, changes in the killing of the food animals that took place as a consequence of reduced numbers of users must have been significant.

5. *Population recovery through social assistance and health care*

With traders came the missionaries and much later government officials, first in the form of law enforcement officers and administrators. The advent of medical care and economic and social assistance is comparatively recent. In much of the North, real improvement of health care is an event of the last 40 years. It resulted in dramatic improvement in infant survival and general health in comparison with circumstances in the 19th century, leading to a rapid and continuing increase in native population.

The population of both the aboriginal races is now much larger than it was 300 years ago. This increase, along with growing numbers of other Canadians in the North, has increased the demand for country food.

6. *Modern changes in hunting technology*

Continuing technological change saw the introduction of much more effective rifles, rifle sights and ammunition; the snowmobile, as a replacement for a dog team, as a

high speed hunting and pursuit vehicle; aircraft as a means of searching for and transporting game; better boats and engines for the pursuit of sea mammals; nylon fish nets and devices for setting them through the ice, etc.

These developments collectively have greatly increased the effectiveness of the hunter and the vulnerability of the hunted. But they have not been accompanied by a corresponding increase in the understanding of the carrying capacity of the land, the size and replacement rate of natural stocks of animals, and what these mean in the numbers that may be taken.

Though the advent of the snowmobile resulted in fewer dogs, and less meat or fish needed to feed them, the net result of the use of these vehicles for hunting is almost certainly detrimental to wildlife.

DEMOGRAPHIC AND POLITICAL CHANGES INFLUENCING WILDLIFE USE

For the past 20 years, the population of the Northwest Territories has been increasing at an annual rate of about 3.9 percent and by 1976 had reached 42,609. Of this number 8,310 were Dene, 13,922 Inuit and 20,377 other, which include about 2,000 Metis. Inuit are forecast to total nearly 20,000 by 1985 and the Dene over 9,000. The importance to this review is that the number of native potential subsistence users of wildlife has increased from 10,500 in 1931 to 25,000 today and looks to 30,000 by 1985.

Wildlife today remains important to both Indians and Inuit as a source of country food, the degree varying from community to community. Stager (1974) found that in Old Crow over half the people secured more than half of their food from the land. In Baker Lake, 38 percent of the food was of country origin (Stager 1977), in Chesterfield Inlet somewhat less (McSkimming & Stager 1978). Pangnirtung is heavily dependent on local wild food resources (McLaren Atlantic Co. 1980).

To many Inuit and Indians, hunting is a deeply rooted cultural behaviour and as such it is far more significant to them than simply as a source of food. They describe it as an inseparable part of their relationship with their environment, the land of their forefathers. Many among them wish to perpetuate this relationship.

If these rapid rates of population increase continue, and the preference for 'country food' persists, it is obvious that the demands on the wildlife resource, especially on caribou, are certain to expand by about a third. One cannot assume that the requirement for wild meat, per person, is the same today as in 1931, because more people are now just part time hunters. But increased hunting efficiency and commercialization of wild game products can maintain the pressure on the resource.

Canada assumed authority for the Northwest Territories in 1870 and the Yukon became a separate administrative entity in 1898. From then until about 1967, administrative decisions were made in Ottawa. In 1968-1969, the evolution to more local responsibility began.

During the 1970's there has been a gradual devolution of authority to the Territories, each of which now has a totally elected Council and Executive Council. The management of terrestrial wildlife is one area now under territorial control except that federal responsibility is retained for all endangered species declared under the Wildlife Act, for migratory birds (Department of Environment), for marine mammals (Department of Fisheries & Oceans), and native welfare in the broader sense (Department of Indian & Northern Affairs). After years of wildlife management conceived by federal biologists and wildlife officers, new administrations based in each of the territorial capitals and responsive to local politics are now in place.

Parallel with the devolution of authority for many functions from the central to regional governments, there has developed the 'native rights' movement, one of the most significant initiatives of this century. One aspect of the thrust for acknowledgement of native rights is prior right of access to wildlife for subsistence use.

NATIVE LAND CLAIMS AND WILDLIFE USE

Negotiations towards achieving agreement on native claims are proceeding in the Yukon, with the Inuit Tapirisat of the eastern and central Arctic, the Committee for Original Peoples Entitlement (COPE) for the Inuvialuit (western Inuit) of the western Arctic, and with the Dene 'Nation' for the Indians and Metis of the Northwest Territories.

Throughout the north of the continent, governments have been striving to design wildlife management systems which recognize the political, economic and technological changes that have completely altered the traditional ways of life. The native rights

movement and the quickening tempo of development of non-renewable resources are the most important political forces. The environmental and conservation concerns championed by many citizen groups cannot be ignored. In the Canadian North, the Yukon, western Northwest Territories, central and eastern Northwest Territories and northern Québec are emerging as four regions with differences in history, demography, biotic potential and stages of political evolution. It is not surprising that no unanimity has yet emerged. The adjacent State of Alaska has proceeded with the settlement of native land claims within the framework of the political system of the United States. An in-depth review of the systems that are emerging is beyond the scope of the present paper but a few aspects can be cited.

Alaska: Alaska, with its native land claims settled, is working out the details of its wildlife management. Subsistence use of wildlife is defined as customary and traditional use, and is not restricted to native people. This is one of the most important differences between the Alaskan settlement and the terms being discussed in Canada. It is tied also to the concept of extinguishment of all special native rights after 20 years (Lysyk et al. 1977). Subsistence use has priority outside the areas surrounding major population centres, but this priority does not mean exclusive use but may be met by "the regulatory provisions of a reasonable opportunity to continue the customary and traditional uses. It may be expressed in longer seasons, earlier seasons, greater harvest limits, protected areas, decreased competition, specific allocations, local permitting, etc." This differs markedly from provisions of the COPE Agreement.

The developing policy recognizes the different nature of management decisions for subsistence use where the allowable harvest is insufficient for all users as distinct from situations where allocations can be made among beneficial users.

It is suggested that customary and traditional uses are non-commercial and non-wasteful uses which have been pursued by a community or a group of persons for a significant period of time.

It is further stated that "priority does not mean that each individual user must individually receive a priority but that the customary and traditional use in an area receive a priority". Further "the unlimited growth of such use need not be considered 'customary or traditional' nor sufficient reason to restrict other beneficial uses" (Alaska Department of Fish & Game 1980).

The proposed rules for the Alaska Wildlife Refuges (U.S. Department of Interior 1981) contain similar definitions of subsistence use and suitable constraints. As in the Alaska Fish & Game document, it is emphatic throughout that biological conservation is paramount. For example, it states that "subsistence uses of fish and wildlife populations must be appropriately regulated so as to assure conservation of healthy populations within Alaska National Wildlife Refuges ... The greater the ignorance of the resource parameters, particularly of the ability and capacity of a population or species to respond to changes in its eco-system, the greater the safety factor must be" (U.S. Department of Interior 1981).

In developing and implementing managment of the fish and wildlife resource there are seven-member Boards of Fisheries and Game with authority to decide on the local application of the principles of subsistence and priority. The Boards receive advice from a system of public advisory committees. The State Department of Fish & Game has final authority and administers the legislation and regulations. The federal input is extensive because of responsibility for marine mammals and for the vast areas of federal land - wildlife refuges, national parks, etc. (Macpherson & Brooks 1981).

Despite progress made, serious problems of detail persist and have led recently to cancellation of the signing of an international agreement relating to the management of the Porcupine caribou herd which uses range in both Canada nad Alaska.

Québec: In northern Québec, agreement has been consummated with the native peoples and operating details are being developed through experience. The wildlife section of the agreement has been spelled out in minute legal detail. Under the circumstances the detail of this document is probably a reasonable safeguard against misunderstanding (Canada 1976a). The terms of the agreement avoid reference to subsistence use by restricting the definitions of harvesting for personal use to native users and by defining all killing of game by non-natives as sport hunting. The non-native subsistence user appears to be ignored.

There is a separate and equally detailed agreement involving the native people of northeastern Québec (Canada 1976a, 1976b). A Coordinating Committee with equal representation from the federal and provincial governments, the Cree people and Inuit, is entrusted with management but subject to the approval of the appropriate provincial or federal minister. One must be concerned about the mismatch between some legal undertakings and the known facts of the biology of some of the harvested species, but the agreement has many useful concepts and provides a model that can be adapted to other solutions.

All management is subject to principles of conservation. This is defined as the "pursuit of the optimum natural productivity of all living resources and the protection of the ecological system of the Territory so as to protect endangered species and to ensure primarily the continuance of the traditional pursuits of the native people, and secondarily the satisfaction of the needs of non-native people for sport hunting and fishing."

Western Northwest Territories: The agreement in principle reached with COPE (Western Arctic Inuit) contains many references to the use of wildife as an Inuvialuit right. It is significant that one of the four principles identified as the purposes of the agreement is "to protect and preserve the arctic wildlife, environment and biological productivity". The agreement embodies many complicated and detailed references to the management and harvesting of wildlife (Anon. 1978a, pp. 69-84). Following are some of the most important provisions:

1. Certain exclusive rights reserved to the Inuvialuit include those to all harvesting of game on Inuvialuit lands; to harvest all fur bearers including all bears and muskox throughout the western Arctic; the preferential right to take all other species of wildlife except migratory non-game and migratory insectivorous birds for subsistence use throughout the Western Arctic, an area defined by specific reference (Anon. 1978, pp. 111-113).

2. An agreement to ensure that all native people who traditionally harvest caribou *from a specific herd* are able to secure equitable share of caribou for food (probably impossible to realize).

3. In general, provision for Inuvialuit participation in all decisions, including the establishment of kill quotas and other regulations that affect their use of wildlife.

4. Acceptance of all traditional and present means of harvesting, subject to laws of general application.

5. A Canadian Government commitment to negotiate changes in the Migratory Birds Treaty which will permit Inuvialuit to kill birds in the spring for use as food.

6. Provision for the sale of *non-edible* parts of wildlife (pelts, tusks, antlers, etc.).

7. Provision for a 5,000 square mile national park (or wilderness area) in the northern Yukon within which people now hunting will be allowed to continue hunting.

8. Provision for the payment of compensation for lost wildlife harvests resulting from developments occurring after the Final Agreement (this will be a legal happy hunting ground!).

9. The clear establishment of the principle of setting quotas for harvests based upon the ability of the wildlife to tolerate the kill.

10. Recognition of the responsibility of the Government of Canada or the Territory, as appropriate, to assure wise management of the wildlife lands and wildlife populations.*

The COPE Agreement, despite some serious ambiguities, will probably provide a model for the other agreements pending in the Northwest Territories. While it raises some interesting problems of allocating exclusive or preferential rights, it provides a framework which could be developed into an effective program for conservation of the wildlife resources. Developing and applying the provisions in an effective way will be complicated especially in the machinery specified for consultation and involvement. It will require acceptance by the hunters of the basic elements of contemporary wildlife management. It will require a level of data gathering and interpretation not hitherto achieved in many parts of Canada, and a staff unlikely to be available within the financial resources of the Territories. It will thus demand carefully programmed cooperation between the federal Departments of Environment, Fisheries & Oceans, and Indian & Northern Affairs, and the territorial government. It will also require that native organizations and hunters themselves view their needs and actions in perspective and scale against the size and dynamic behaviour of the resource.

It is implicit in this agreement that subsistence use of all forms of wildlife by Inuit has priority over all other use where the stock can support a kill. Yet no clear definition of aboriginal subsistence use has achieved general acceptance in Canada. Establishing such a definition with clearly defined limits is an urgent need.

The Northwest Territories Fish & Wildlife regulations avoid reference to subsistence, traditional or customary use. They circumvent the problem by providing a general hunting licence, mainly to the native people. This has few restrictions attached, but hunting

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* The Minister of Indian & Northern Affairs announced in late 1980 that the Government of Canada was unable to implement one or two of the provisions of the COPE Agreement.

of caribou is strictly controlled by quotas. The important issue becomes the validity of the quotas in relation to the annual performance of the species. The Department draws heavily upon the local Hunting and Trapping Associations for advice related to all matters of local impact. This is a useful procedure which involves the Inuit and Dene as partners in managment but it is being questioned by the Chiefs and Band Councils of the Dene. Under the existing Ordinance (Anon. 1968b), the final authority rests with the designated members of the Northwest Territories Executive Council.

It should be noted that quotas for muskox and polar bear are assigned and accepted on a Hunters and Trappers Association basis and that the Cumberland Sound Inuit have agreed voluntarily to a restricted kill of beluga in an attempt to halt a continuing decline in numbers.

Yukon: In the Yukon Territory, the approach to wildlife use and its regulation appears to maintain a central authority. At the same time the wildlife resource has a priority position well below that of development and the 'frontier attitude' has been a matter of public complaint by those responsible for the wise use of wildlife (Hartman 1980). It matters little where the authority rests if the resolve is not there and the required data unavailable.

Though the Yukon Government seeks to avoid special status for Indians, it proposes to protect subsistence hunting by both Indians and non-Indians. It can accept exclusive Indian hunting, fishing and trapping rights on Indian lands as a property right, but it opposes special legislated rights for Indians in other parts of the Yukon (Lysyk et al. 1977). In this regard, the Yukon attitude is closer to that of Alaska than to the trends elsewhere in the Canadian North.

Regional philosophies are no doubt influenced by the political environment. The Alaska orientation reflects a strong state government with a substantial expertise and experience in wildlife and fisheries managment, very large areas of federal lands bearing priority designation for use, and the context of the political philosophy of the United States. In Québec, the settlement was negotiated within a strong provincial policy and many years of experience in wildlife and fisheries management for both subsistence and recreational use. In the Yukon, the assumption of responsibility for wildlife and fishery managment is recent, there is limited expertise, and a long history of recreational use of big game and fish. A high proportion of the population is of European ancestry. The Northwest Territories government is unique in Canada in that the elected representatives are largely drawn from the native people and thus represent the philosophy of the subsistence users, but in a contemporary context.

ENVIRONMENTAL CHANGES INFLUENCING THE ABUNDANCE OF WILDLIFE

All 'northerners' are keenly aware of the ever increasing introduction of industrial development in their region. Along with its economic benefits, development gives rise to increased access to wildlife stocks in hirtherto remote areas, harassment by noise, additional hunters and fishermen of 'southern' orientation, environmental alteration through highways, air fields, seismic lines and oil well drilling or other industrial sites, ice breaking for ship passage, pollution and the increased destruction of forest and tundra by fire.

Several major intrusions into the natural landscape, such as the Dempster Highway, the Mackenzie Valley Highway and the Pine Point Railroad were undertaken with little thought for the ways in which their presence would alter the behaviour or numbers of wildlife species. Others such as the Mackenzie Valley Pipeline proposal, the Alaska Highway pipeline, the mine at Nanisivik, and the gas processing plants in the Mackenzie Delta were the subject of extensive hearings and published reports.

Exploration for hydrocarbons and minerals is widespread and where discoveries have been made, detailed studies are in progress looking to transportation of the products to market (Roots 1979). Flooding of river valleys and lake basins are among the proposals.

These developments introduced people and equipment into remote areas visited only by the subsistence users in the course of their hunting and fishing activities. Settlements have developed and disturbance of the natural scene is widespread. Those who depend on the wildlife for their subsistence and look upon the opportunity to live the life of a hunter-fisherman have observed alterations in the distribution of wildlife and have noted some behavioural changes. They reason cause and effect and are profoundly disturbed.

The details are spelled out by Berger (1977) and Lysyk (1977) and were referred to extensively during the Baker Lake trial (Tester 1980; Herchmer 1980).

The matter of disturbance of wildlife by the presence and activity of man is a most complicated issue. The nature and frequence of the disturbance, the species of wildlife, the biological circumstance of the animal exposed to it (sex, age, nutritive state, group size, snow depth, fly harassment and presence of other disturbances) all influence the impact. There is little scientifically acceptable information as to the consequences.

Aircraft overflight at low altitude is known to disturb some species, but the consequences in induced changes of seasonal movements, survivorship or reproductive success are unknown. There is evidence from Alaskan experience that caribou herds whose migratory path is intersected by a highway decline in numbers.

Some recent studies have begun to amass the needed data (Miller & Gunn 1979). A new source of concern arises from the increased use of icebreakers and other shipping in arctic seas. Types of potential impact upon marine mammals so far identified include alteration of ice and water patterns, changes in the characteristics of some areas of ice and the introduction of new levels of noise into the marine environment. The new noise levels can be so great as to presume the possibility of temporary or even permanent impairment of the hearing of marine mammals exposed to it (Mohl 1980). It is the unknowns that are worrisome, especially those surrounding such major changes as all season icebreaking and ship transport. It is reasonable for the subsistence user to attempt to prevent such development-induced changes.

On the other hand, it is difficult to appreciate the logic that sees the disturbance created by a mineral exploring party as detrimental to wildlife but sees nothing damaging in the pursuit by snowmobile of caribou, moose and other animals, accompanied by the discharge of firearms and the frequent residue of wounded animals.

It can be widely observed that human settlements in the North lead to abandonment of the region by some forms of wildlife, local depletion of species favoured as food and species shifts in other forms. At the same time there is abundant evidence that many species habituate to human activity where they are not shot at or otherwise molested.

There is no doubt that human activity in the North influences the numbers and distribution of some wildlife species. Some information is available that can guide activity into less damaging patterns, or can lead to the conclusion that certain areas must remain free from the impact of development on their flora and fauna. However, moves to set these areas aside under special protective regulations are slow in coming.

THE CONSERVATION OF NORTHERN WILDLIFE

Where wildlife is abundant, elusive or resilient, and human killing a minor factor, little conscious management may be required. However, as the numbers sought for human use move upward toward the potential removeable surplus of the species in many areas, effective management becomes essential. This cannot be achieved without a strong basis

of facts about the species and its environment. Management usually involves placing restrictions on the numbers killed by man, but such initiatives will fail unless the regulations are generally accepted and impartially enforced.

The hunters and trappers who for generations have pursued wildlife in order to survive have amassed much information about the resource. This can be informative in matters of behaviour or responses to natural phenomena, of time and places of birth, routes and timing of migrations and characteristics of favoured places and similar natural history observations. But the insights on quantitative phenomena, such as populations, replacement rates, mortality rates, losses to predation, hunting and accident, etc., that can be gained, tested and interpreted by scientific research are essential to effective management of wildlife populations. The closer the demand approaches the limits of supply, the more refined and immediate must be the data. The greater the ignorance the greater must be the safety factor.

Research base for management

There is a strong data base on some species of arctic wildlife gained over the last 50 years by a small group of biological explorers, mainly from the Canadian Wildlife Service and the universities.

Recently this has been greatly increased by the concentrated well-funded research related to predicting the impacts upon wildlife of major economic and transportation developments in the North (Berger 1977; Lysyk et al. 1977; Roots 1979). But since 1978, research on the impacts of the various changes induced by the developement has dwindled and become short term. Berger (1977) referred to many research questions in urgent need of answers. Now, four years later, few of the needed studies are yet in progress.

The basic biological details of the barrenground caribou, muskox, bison, Dall sheep, polar bear, ringed seal, beaver, muskrat, arctic fox, snow goose, willow ptarmigan and whooping crane are known. There are some data on wolves, grizzly (in the Yukon), walrus, beluga and Ross goose. For all of these, management requires constant updating of the data, which change with time as populations are preyed upon, hunted, disturbed, and altered by weather and other forces.

Little reliable information is available on other fur bearers (moose in the northern environment, grizzly in the tundra habitat, wolves dependent on migratory caribou, Peary caribou), on some marine mammals (bearded seal, narwhal, bowhead) or on arctic nesting waterfowl and other birds, e.g., the little brown crane.

There have been detailed studies of the coastal tundra vegetation in association with the reindeer industry near Inuvik and more extensive studies of caribou range and the impact of fire on it (Kelsall 1968; Scotter 1964). The tundra studies reported in Bliss (1977) on Devon Island are detailed and precise. The Arctic Land Use Research Committee has sponsored much land based research directed towards management.

In the last ten years there has been a decline in the staff available to the Canadian Wildlife Service for northern research and a decrease in money available to universities for this purpose. The responsibility for research on the management of northern terrestrial wildlife has been transferred largely to the territorial governments, where priorities are for the conservation of endangered species and the management of those species used most heavily.

There is no justification for the view that enough is now known to provide for the effective management of wildlife species in the Yukon or Northwest Territories. It is probably true that much of what is known is not yet being effectively applied, but this is only a small part of what will be needed as problems intensify. Dependable data take a long time to gain and lapses in effort and investment are likely to haunt us in the future. If the staffs of the territorial governments are going to be fully occupied developing, implementing and monitoring a new management regime, they will need all the research support they can muster from outside their own organizations.

A most important development has been the establishment of the Science Advisory Board of the Northwest Territories. This has already commissioned several wildlife studies designed to support management (Dickinson & Herman 1979; McCart & Den Beste 1979; Fuller & Hubert 1980).

Wildlife management prior to 1967

Until 1967, wildlife management was a responsibility of the federal government. The Canadian Wildlife Service conducted research and provided advice while the northern administration staff of the Department of Indian & Northern Affairs developed the regulations which were enforced by a few regional wildlife officers and the RCMP. It was an authoritarian system with little consultation and it gradually lost favour with the growth of self determination and the consultative mode of decision making.

Nevertheless there were major accomplishments in this period: the recovery of the muskox from near extinction and of the caribou from the 1940's collapse and the reestablishment of the caribou on Southampton Island after the original stock was extirpated by subsistence users. With international cooperation, the polar bear

was placed on a management regime that reversed the steady decline in numbers. The breeding ground of the whooping crane was discovered and international arrangements made to rescue the species from near extinction.

There were also failures: the Kaminuriak caribou herd entered 20 years of decline which continues today and the Beverly and Bathurst herds developed the first signs of the same fate because of overkill; the moose population declined as did the the most accessible population of Dall sheep, barrenground grizzly and some fur bearers. The beluga populations of Cumberland Sound, Ungava and eastern Hudson Bay were reduced to fractions of their former size.

These failures often resulted from the inability of the managers to enforce regulations or to elicit self-interested cooperation from the hunters. The destruction which the wildlife professional could foresee and document was often denied by the subsistence users to be a consequence of their excessive killing.

Simmons (1979) phrases the misunderstanding: "Imbedded in the rhetoric of northern politics is a description of the Indian and Inuit as natural conservationists who are proper custodians of their own wildlife resource. According to this scenario, the southern trained wildlife manager is an unnecessary and frequently unwanted obstacle. The wildlife manager, on the other hand, commonly sketches the northern native as the myopic, selfish, cause of wildlife population decline ... This clash of viewpoints is symptomatic of the fact that our conservation ethic, founded in Europe in the 16th century, is relatively new to the barren ground caribou hunter ... Hunters, who until recently, could not significantly influence the future of a caribou population have difficulty accepting the suggestion that suddenly they have become poor stewards of the resources with which they have been living harmoniously for many centuries. Science is not part of the Indian or Inuit tradition".

Division of responsibility today

The Yukon and Northwest Territories have assumed responsibility for the management of and research of resident terrestrial wildlife species and migrant mammals while within their boundaries. Environment Canada maintains its concern for migratory birds as required by international treaty and is also responsible for endangered species recognized by the federal government, and for the management of National Parks. The Department of Fisheries & Oceans exercises management and research authority over marine mammals, and the marine and anadromous fishes.

The federal government is working toward native claims settlements which will involve major decisions influencing the use of wildlife and fish.

The Northwest Territories has established a substantial wildlife and fisheries management staff with research capability.

Population fluctuations in northern wildlife

It is known that northern wildlife species are far more subject to environmentally induced catastrophes than are the species of more benign climates on which most of our experience of wildlife management and expectable crops has been gained. Northern caribou can experience several successive years in which the surviving calf crop is below replacement rate (Kelsall 1968); muskox (Thomas et al. 1981) and caribou have been greatly reduced or even extirpated locally by winter ice storms; severe ice conditions are believed responsible for a crash decline in the ringed seal of the Beaufort Sea in 1974 (Stirling 1977); snow geese and brant have been known to suffer almost total loss of the young from one or more nesting attempts in a given year.

Events such as these give rise to radical changes in the annual permitted kill with grave consequences for those dependent upon wildlife. Crop failures in the past have forced subsistence users to turn to alternative foods and, in extremes, have led to famines and no doubt resulted in the low average densities of aboriginal people in the Canadian North.

It is very easy to overharvest populations of some arctic mammals and birds. Their frequently low success rate in bringing their young to maturity renders them subject to crash declines. McCart & Den Beste (1979) emphasize the same feature of northern fish populations.

Today's technology, in the short term, insulates the northern resident from the consequences of either the natural catastrophes or the steady downward trends arising from overkill (Macpherson & Brooks 1981). Hubert (in lit. 1980) states "with current technology and the abundance of funds for resource harvesting the 'crop' does not fail, the 'cropper' always finds it". Food is flown in and the search for the remaining wildlife is intensified by use of aircraft and the snowmobile. No longer is man dependent on wildlife for his survival but rather the survival of wildlife now rests on the care and responsibility exercised by man. The primitive relationship has been reversed and new forms of response are required.

CURRENT MANAGEMENT OF THE WILDLIFE RESOURCE

No detailed objectives to guide the conservation of wildlife in the Yukon and Northwest Territories have been seen. General objectives along with existing regulations imply these goals:

1. To restore the numbers of endangered or depleted species and stocks.

2. To maintain self sustaining populations of all species that occur naturally in the northern areas of Canada.

3. To maintain populations of preferred food species and of fur bearing mammals at close to maximum productivity so that they will yield a harvest for the subsistence, economic and recreational use of native northerners and others.

4. To manage the kill of migratory species with due concern for others interested in the same stocks.

5. To manage the use of resident species in a manner consistent with goals 1 to 3 above.

These goals must be pursued in an environment in which the number of potential subsistence users is about three times primitive levels and their rate of increase among the highest in the world; in which the number of new residents is increasing rapidly; in which major industrial development of the non-renewable resources is proceeding rapidly; and in which the weather-induced variations in the reproduction and survival of many wildlife species are great and often persistent.

Commercial use of wildlife

Over most of North America, the sale of wildlife is confined to the pelts of fur bearing animals, alligator hides, and a small market for trophy heads or the unwanted hides arising from the legal kill of ungulates.

In the subarctic and arctic parts of the continent where hunting and fishing is largely a subsistence activity, market hunting has been part of the economy and is still seen as a potential source of employment for Inuit and Indian residents. The products include fur pelts, walrus and narwhal ivory, beluga muktuk, arctic char and the meat of caribou and certain other species.

There have been suggestions that the wildlife kill in the Northwest Territories can be greatly increased. Freisen and Nelson (1978) propose a potential annual crop of 150,000 caribou, basing this on earlier figures suggested by Kelsall (1965). They also suggest commercial meat fisheries for seals and beluga. Their figure for caribou now seems far beyond any realistic potential, even ignoring the fluctuations in calf survival which render impossible a continuing and predictable level of kill.

Fuller & Hubert (1980), basing their calculations on the minimum daily human requirement of protein, state that the present stocks of fish and game could provide for about twice the present 49,000 people in the Northwest Territories, and under intensive management could provide the protein needs of five times the present population. There are problems with this forecast. People do not eat bush-meat just to satisfy minimum protein needs and use between one and two kilograms per day rather than the 35 gram minimum; it ignores the wastage and the amount of meat and fish used as dog food. Besides, there are no accurate figues on the present kill, nor on the long term effective reproductive rate and weight increment to the stocks of game and fish. Thus the figures cannot be used as a basis for predictive management and may be dangerous if they give rise to the attitude that a massive increase in kill can be sustained. Their view is contradicted by Thomas (1979) for caribou, who sees the entire territorial population of this species threatened.

In short, there is no evidence that can encourage the belief that the game animals offer potential additional employment for market hunting. Commercial hunting provides strong stimulus to kill beyond the need of the hunter and his family for food; it protects those who have mismanaged local stocks from having to face the consequences of their action; it means that those who have opted for the wage economy can still impose a subsistence drain on wildlife; and by encouraging the development of a corps of commercial hunters, it adds another form of pressure to resist needed reductions in kill when that is required.

Under present management, the amount of commerical use of caribou is restricted by quotas applied on a herd-by-herd basis. None the less, the potential to sell encourages seeking to fill or exceed a quota even though it is not required for subsistence.

Present status of wildlife

Figures available are imprecise and for only a few species. Muskox populations on Banks and Victoria islands appear to be thriving as do caribou on the latter. The one population of Dall sheep accessible to subsistence hunting is reduced in numbers, but stocks

out of reach are thriving. Moose are thinly distributed and appear to be decreasing in the Northwest Territories.

Northline (1981) reports that "Caribou herds in the Northwest Territories are in danger of disappearing even as wildlife officials attempt to institute a management program to save them ... High predation by hunters and wolves is believed to have caused the swift decline of the once plentiful herds over the last decades. Three of the herds most seriously endangered are the Beverly, the Kaminuriak and the Bathurst." Each has declined in numbers to between one-half and one-third of its size a decade ago. Each herd has been experiencing a human kill exceeding its renewal rate and, in addition, a substantial loss to wolves.

The Porcupine herd of caribou in the Yukon appears to be stable under present use but the long term impact of the Dempster Highway is yet to be seen. Other stocks of wildlife in the Yukon also appear to be stable.

The largest herd of caribou is now the George River herd ranging through northern Labrador and northeastern Québec. It has increased dramatically over the last two decades.

The data on marine mammal populations are equally imprecise. The narwhal population appears to be larger than earlier believed. Beluga are probably fully exploited with the Cumberland Sound stock and two other stocks badly depleted. The bowhead has shown no measurable recovery despite 70 years of almost total protection. Seals are not used as much for food as formerly and no signs of reduction in numbers from hunting are reported. Walrus numbers are completely unknown (Davis et al. 1980).

The statistics on numbers of the fur bearing mammals suggest a slow but steady decline in beaver populations and perhaps also of marten. Other species reveal no certain change (Dickinson & Herman 1979).

Increased gain from the present kill

There is ready opportunity to increase the benefit gained by users of wildlife without the destruction of more individuals.

a) Eliminate the often gross wastage of animals killed or wounded. (The slaughter of caribou far beyond need for food by both Inuit in the Coppermine area and Indians in northern Saskatchewan are matters of recent record. Many of the animals killed went unused and the wounded were left to die or recover).

b) Ensure that special care is taken not to leave wounded animals after the hunt.

c) Improve the techniques used to kill marine mammals so that the number shot but not recovered is greatly decreased.

d) Reduce as far as possible the use for dog feed of meat and fish fit for human consumption.

e) Improve the efficiency of use of animals killed. Much meat is now wasted.

f) Improve the handling of fur skins to maximize their market value.

g) Act as guides for hunters from 'outside' and thus gain substantial income and still have the meat for home use.

Management of wildlife in the Northwest Territories

The territorial management staff faces a daunting task. The Territories is 'home' to the largest population of subsistence users of wildlife in Canada. The political climate, involving the contentious native land claims issues and the social and environmental disturbance accompanying the search for hydrocarbons and minerals, adds to the complexities of the management task.

The new regime has assumed its task at a time when the rapidly increasing Inuit and Indian populations appear to be imposing subsistence demands on the wildlife that, for caribou and moose, are beyond the tolerance level.

The increased mechanization of the hunt arising from the widespread use of snowmobiles, the introduction of the 'fly out hunt' whereby, apparently with government sponsorship, parties of hunters are flown out to find game, and the outpost hunting camp innovation also recently sponsored by government, all conspire to bring more and more animal populations under threat. Animals such as grizzly and wolverine which can be tracked and run down by hunters on snowmobiles are now more than ever threatened. In much of Canada, some species of wildlife have survived because of remote, inaccessible reservoir areas. Such places have been almost eliminated by roadbuilding, the snowmobile and the fly out hunt. Many species are now seriously at risk.

The Northwest Territories management team has rightly concluded that their task can only be accomplished with the cooperation and participation of the subsistence users. They have established

a training school for Indians and Inuit wishing to train as wildlife technicians and have employed the graduates. They are seriously attempting to dispel cross-cultural mistrust and to introduce the concepts of contemporary management, involving local Hunters and Trappers Associations in some of the decisions. There is still a long way to go. How far can be sensed from a reading of the report of the First National Caribou Conference held in Snowdrift, Northwest Territories in April 1981 (Desjarlais 1981). The 'two solitudes' are very much alive. All the myths, biases, cross-cultural mistrust, ingenuity in laying the blame for overkill on others, as well as local political tension, are apparent.

The appropriate mix of central authority and local participation must evolve over the next few years.

In 1980, a political proposal to pass responsibility for managing wildlife to the local Hunters and Trappers Association beginning with the Keewatin Association (Press Release 80-143, May 2, 1980) was fortunately not implemented.

Where locally resident wildlife is concerned, once the allowable kill is determined from biological monitoring, the local Hunters and Trappers Association can have a major role. There are many examples of native people practising restraint in harvesting wildlife in the interest of their long term gain. Gamble (1981) provides some examples, a recent one being the voluntary quota on beluga accepted by the Cumberland Sound hunters.

Effective cooperation between the Northwest Territories wildlife administration and Hunters and Trappers Associations is demonstrated in the polar bear management scheme (Schweinsburg 1981) and that for managing muskoxen on Banks Island.

The organization for decision making on Beverly and Kaminuriak caribou herds which migrate annually from the Northwest Territories into the adjacent provinces must include provincial as well as territorial involvement and the role of local decision-making should be minimal. Where migratory birds are concerned, other Canadian provinces and the United States have legally defined interests and the federal government has overall responsibility.

Local political tensions persist and are likely to be detrimental to wildlife. An example is that between the Chiefs and Band Councils on the one hand and the Hunters and Trappers Association on the other, reported by Desjarlais (1981). A similar problem in another jurisdiction is the controversy between Newfoundland and Québec over the harvesting of the George River caribou herd (Anon. 1981b).

CONCLUSIONS

1. The northern territories of Canada comprise one of the world's largest areas in which the native people lived primarily as hunters, a tradition which still persists among many. Subsistence use still provides between 25 percent and 50 percent of the annual food requirements of large sections of the population.

2. Even though many Inuit and Dene play an active part in the wage economy, they prefer country meat and are encouraged by their culture and by the authorities to secure it.

3. During the past 30 or more years, the populations of both Inuit and Dene, with the benefits of improved health care, housing and social welfare, have more than doubled. The doubling time is now less than twenty years. The great majority are no longer nomadic, and have little opportunity to fit their individual and family life styles around the occurrence and behaviour of wild animals. Urbanization will probably expand in the future.

4. The preferred meat animal for both Inuit and Dene is now the caribou. Thirty five years ago there was a serious decline in numbers of this species, which recovered its numbers under rigorous control of wolf predation and human kill. The most accessible herds are now declining again. The lesson was poorly learned.

5. Ringed seal, formerly killed in large numbers for meat, is no longer eaten as extensively but is killed in large numbers for its skin.

6. Hunting techniques have been revolutionized, aircraft are now regularly used to search for animals, to deposit hunters among the game and to transport the carcasses home, the snowmobile has largely replaced the dog team and is used for hot pursuit of wildlife and as a shooting platform. These two changes have removed the most effective protective circumstances (inaccessibility) that the animals have had in the face of rather primitive management regimes. Hunting practices have developed with a focus on meeting immediate needs rather than long term maintenance of the wildlife stocks. No longer is man dependent on animals for survival but rather the survival of animals now rests on the wisdom and restraint of man.

7. The introduction of the snowmobile as a hunting tool poses serious threats to grizzly bear and to wolverine, one of the rarest of Canadian carnivores. These can easily be tracked over snow, run to exhaustion and killed.

8. Several caribou herds pass from provincial territory through Dene hunting grounds in the Northwest Territories on their way north to summer ranges where they are accessible to the Inuit. These cannot be managed on an individual jurisdictional area basis.

9. A small amount of commerical hunting has been permitted (over and above fur trapping). This has involved sale of walrus and narwhal ivory, hides, muktuk and some meat of food animals. Commercialization has been proposed as an opportunity for new jobs for native people. There is no evidence to suggest that there is opportunity for greatly increased commercialization of northern wildlife where this involves increased numbers killed.

10. Massive developments, largely in mining and hydrocarbons exploration development and transportation, are subjecting parts of the Northwest Territories and the Yukon to intensive local physical change and the disturbance of increased activity of men and machines on the ground, in the air, and through the frozen seas. The long term consequences for wildlife of these activities is unknown and requires further and longer term research.

11. Different philosophies are guiding the development of new management regimes in Alaska, Québec/Labrador and in the Yukon and Northwest Territories. Major differences exist in the vision of citizenship; the discrimination between native and non-native subsistence user; the concern for recreational use of wildlife; the manner and extent of participation of the subsistence user in decisions about wildlife management regulations and the sale of wildlife products. They have, in common, provision for priority use of wildlife for subsistence purposes, and arrangements for such users to participate in the decisions on hunting regulations.

    Circumstances in the Northwest Territories is more complicated than elsewhere and the need for up-to-date information greater. The caribou stocks are in danger of collapse. Alternatives are unavailable, given the dominant position of this species in providing country food to inland hunters.

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